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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,030	01/28/2004	Richard K. Williams	M7207US4D	4737
27906	7590	11/04/2004	EXAMINER	
PATENT LAW OFFICES OF DAVID MILLERS 6560 ASHFIELD COURT SAN JOSE, CA 95120			KESHAVAN, BELUR V	
			ART UNIT	PAPER NUMBER
			2825	

DATE MAILED: 11/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/767,030

Applicant(s)

WILLIAMS ET AL.

Examiner

Belur V Keshavan

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5-8,10 and 12 is/are rejected.
- 7) ☐ Claim(s) 2-4, 9 and 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>28 January 2004</u> / <u>4/19/04</u> | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION*****Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. The drawings do not show the features claimed in the claims. Therefore, the features of claim 12 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replaced drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objection***

Claim 9 is objected. In claim 9, "dopant of the first type" is not clear. The examiner suggests "dopant of the first conductivity type" instead.

Art Unit: 2825

Any further rejection of, indication of the allowability of, claim 9 is based on the claim 9 as it is understood by the examiner.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 5, 7, 8, 10 is rejected under 35 U.S.C. 102(e) as being anticipated by Mo (U.S. Patent No. 6,583,010).

Regarding claims 1 and 10, Mo discloses a method of fabricating a MOSFET (40), in columns 3-5 and in figures 4 and 5, comprising: forming a trench (46) in a surface of a semiconductor (42), the trench defining a mesa (58); forming a first insulating layer (48) along a wall of the trench; forming a gate (50) in the trench, by introducing polysilicon (52) into the trench, the gate being insulated from the semiconductor by the insulating layer (48); performing a plurality of implantations of dopant of a first conductivity type (58 and 66) into the mesa to form a body region wherein each of the implantations has a different energy (column 5, lines 19-45, and steps 514 and 516 in figure 5) ; and implanting dopant of a second conductivity type into the mesa to form source region (60).

Regarding claim 5, Mo discloses wherein a first of the implantations is at a first dose (column 5 line 21) and a second of the implantations is as a second dose (column 5 line 33), the second dose differing from the first dose.

Art Unit: 2825

Regarding claim 7, Mo discloses in column 5 lines 50-59, completing the MOSFET without performing a process to diffuse the dopant of the first conductivity in the body region, and in column 5 lines 19-25 wherein energies of the implantations control a depth of a body-drain junction at an interface between the body region and an underlying portion of the semiconductor.

Regarding claim 8, Mo discloses, in column 4 lines 57-65 and figures 4 and 5, wherein forming the trench comprises: forming a hard mask on the semiconductor (step 506 in figure 5); and etching the semiconductor through an opening in the hard mask to form the trench (46).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mo in view of Sze (Semiconductor Devices, Physics and technology, 1985, pp (420).

Mo teaches all of the features and limitations of the base claim but lacks chained implantations such that implantations in combination provide a uniform doping for the body region. However, the chained implant technique is notoriously well known in the art of which the examiner takes Official Notice. In support of this assertion, the examiner cites Sze wherein the combination of implantations is used to achieve an uniform doping for the body region. It would have been obvious to one of ordinary skill in the art to use the teachings of Sze to modify or add to the method described in MO with the objective to minimize the vulnerability of the device to punch through breakdown.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mo in view of Sze (Semiconductor Devices, Physics and technology, 1985, pp (451-452).

Regarding claim 12, Mo anticipates claim 1 as given above and further Mo discloses, in column 3 lines 53-54 and in figure 4, forming a second insulating layer (56) over the mesa; a contact opening in the second insulating layer and depositing a metal layer (72) into the contact opening to form an electrical contact with the source region (70). Mo is silent about etching the contact opening in the insulating layer. However the art of etching a contact opening through an insulating layer for electrical connection is notoriously very well known in the art, of which the examiner takes Official Notice. In support of this assertion, the examiner cites a textbook by Sze (Semiconductor Devices, Physics and technology, 1985, pp (451-452). Therefore it would have been obvious to a person of ordinary skill in the art to use the teachings Sze to modify or add to the method described by Mo to make electrical contact to the mesa.

Art Unit: 2825

***Allowable Subject Matter***

Claims 2, 3, 4, 9 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Belur V Keshavan whose telephone number is 571-272-1894. The examiner can normally be reached on 8-4:30 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BVK. *BVK*  
October 19, 2004.

Belur V. Keshavan.  
Examiner. Art Unit 2825.

*B. Keshavan*  
GAMAD EVERETT  
PRIMARY EXAMINER